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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of

Applicant: PAI, Deepak

Group Art Unit: 1753

Serial No.: 09/922,060

Examiner: MAYEKAR, Kishor

Filed: August 3, 2001

For: DIELECTRIC BARRIER
DISCHARGE PLASMA REACTOR CELL

AMENDED APPEAL BRIEF

Commissioner of Patents
Customer Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Dear Sir:

Further to applicant's Notice of Appeal filed on June 28, 2006 and the Notification of Non-Compliant Appeal Brief mailed on September 8, 2006, applicant requests that the Notice of Appeal of June 28, 2006 be replaced with this Amended Appeal Brief made in Response to the Notification of Non-Compliant Appeal Brief for the above-captioned case.

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I. REAL PARTY IN INTEREST

General Dynamics Advanced Information Systems, Inc., of Bloomington, Minnesota, whose ownership interest appears in an Assignment recorded September 13, 2001 at Reel 012162, Frame 0213.

II. RELATED APPEALS AND INTERFERENCES

There is no pending appeal or interference or judicial proceeding known to appellants, the assignee or to the undersigned that may be related to, directly affect, or be directly affected by, or have a bearing on the Board's decision in this case.

III. STATUS OF CLAIMS

The application was originally filed with thirty six (36) claims. An Amendment was filed on November 24, 2003 in response to the Office Action mailed on May 30, 2003 in which claims 1, 35 and 36 were amended. An Amendment under 37 C.F.R. §1.111 was filed on September 21, 2004 in response to an Office Action mailed April 22, 2004 in which claims 1, 13, 22-25 and 36 were amended, claim 12 was canceled, and claims 37-57 were newly presented. An Amendment under 37 C.F.R. §1.116 was filed on March 7, 2006 in response to an Office Action mailed December 7, 2004 in which claims 1 and 36 were amended and claims 37-57 were canceled. An Amendment under 37 C.F.R. §1.111 was filed on October 12, 2005 in response to an Office Action dated July 20, 2005 in which claims 1, 35 and 36 were amended. A Reply was filed on March 1, 2006 in response to an Office Action mailed December 28, 2005. The Advisory Action mailed March 29, 2006 rejected the Reply. Claims 1-11 and 13-36 are currently pending and remain rejected from the Office Action mailed December 28, 2005. Claims 12 and 37-57 have

remain cancelled. Thus, the claims on appeal are claims 1-11 and 13-36, the text of each of which appears in the Appendix attached to this Brief.

IV. STATUS OF AMENDMENTS

As indicated in part III. above, Applicants' last amendment of October 12, 2005, has been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The subject matter of the claims on appeal is a dielectric barrier discharge plasma ("DBDP") cell 10 that includes a dielectric 20 spaced apart from a conductor 30. The dielectric includes various surfaces, a conductive coating 26 and a protective coating 28. Cell 10 is adapted to generate plasma in the space 14 between the conductor 30 and the dielectric 20, the plasma removing harmful agents from atmosphere in cell 10. Dielectric 20 and the conductor 30 are positioned to create a turbulent airflow there between. See, for example, Figs. 1 and 2, and generally specification page 12, line 7 through page 14, line 6.

The dielectric 20 and conductor 30 responsible for the creation of turbulence being particularly defined in independent claims 1, 35 and 36 on appeal as follows:

> ... said dielectric and said conductor are positioned to create a turbulent air flow therebetween,

See for example, Figs 1, 3, 5, and specification page 12, lines 7-11, page 14, lines 19-26, and page 15, lines 10-13.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The final Office Action mailed December 28, 2005 stated the following rejections, reversal of which is sought by this appeal:

1. Claims 1-7, 9-11, 13-17, 19-21, 24-34, and 36 were rejected under 35 U.S.C. § 103 as obvious over Gadow U.S. Patent 5,955,038 in view of Kinney U.S. Patent 3,622,492.

2. Claims 8, 18, 22 and 23 were rejected under 35 U.S.C. § 103 as obvious over Gadow in view of Kenny and Racca U.S. Patent 6,024,930.

3. Claim 35 was rejected under 35 U.S.C. § 103 as obvious over Gadow in view of Kinney and Iwanaga U.S. Patent 5,411,713.

Applicant requests review and reversal of the rejection of all pending claims. The status of all pending claims, including dependent claims 2-11 and 13-34, rises and falls with the status of independent claims 1, 35 and 36.

VII. ARGUMENT

1 The §103 rejection of Claims 1 and 36
Is Without Basis in the Cited Prior art.

The instant application, filed a few weeks before the September 11 terrorist attacks, is directed to a methodology for eliminating chemical agents and biological pathogens (collectively referred to in the application as "harmful agents") from the air. A plasma cell, in which an AC current is applied between a dielectric and a conductor, generates electrically neutral gas molecules, charged particles in the form of positive ions, negative ions, free radicals and electrons, and electromagnetic radiation (photons) permeating the plasma-filled space there between. These species are highly reactive and can rapidly decompose other inorganic and

organic compounds. Contaminated air passing through the plasma cell will exit substantially contaminant free.

An exemplary application of such technology would be in an air conditioning system. Recent television shows such as "24" illustrate how biological and chemical agents introduced into a ventilation system can rapidly spread throughout a building to afflict all of its occupants. One or more plasma cells according to the present invention strategically placed in such a ventilation system would substantially neutralize such contaminants in the air before they reach the building occupants.

Plasma cell technology relies upon applying an AC voltage to a spaced apart dielectric and a conductor to generate the plasma there between. Applicants have discovered that the dielectric and the conductor can be arranged to induce turbulence in the flow of gas through the plasma cell, which results in various beneficial effects. Fig. 7 of the application shows a non-limiting example of a structure which is positioned to create such turbulence. All of independent claims 1, 35 and 36 recite this feature.

The pending rejections consider the above claims to be met by the combination of Gadow (US 5,955,038) and Kinney (US 3,622,492) under 35 U.S.C. § 103. Gadow is considered to teach all of the elements of, *e.g.,* claim 1, except for the feature of the conductor and dielectric being arranged to induce turbulencee in gas flow. The Office Action ostensibly turns to Kinney for its teachings of "an ozonier the creating of turbulence in the gas stream within the space between the conductor and dielectric" and thus would be an obvious combination with Gadow.

Kinney discloses a spaced apart dielectric and conductor. However, nothing in the position of these elements appears to create any turbulence in the airflow. To the contrary, Kinney teaches the use of other components to provide turbulence: "the gas stream may be

baffled or otherwise manipulated to become turbulent with the species between electrodes and dielectrics . . ."; see Kinney col. 4, lines 20-25. In the Advisory Action, the Examiner interpreted this disclosure as calling for a baffle between the dielectric and conductor; see Advisory Action Continuation Sheet, paragraph 1.

At best, the above teachings would motivate one of skill to add baffles to the Gadow structure to induce turbulence. However, nothing in Kinney teaches or suggests that the dielectric and the conductor are responsible for the creation of turbulence, or that their position is responsible for inducing turbulence, as recited in the independent claims. The above compensation of references therefore fails to teach or suggest that the conductor and dielectric *be positioned* to create that turbulence, as recited in the pending independent claims.

Applicant pointed out the above deficiencies of the applied references in the Reply Under 37 CFR 1.116. In the subsequent Advisory Action, the Examiner stated that Kinney's teachings of baffling the gas flow stream would require a baffle attached to either the dielectric or the conductor, which would "be equivalent" to the braided electrodes in Fig. 7 of the instant application (which provides exemplary support for the claimed structure). It is unclear to Applicant as to how the Examiner reaches this factual conclusion of equivalents, or its legal bearing on the rejection for obviousness.

Considerations of equivalents during patent prosecution is limited to claim terms covered by 35 U.S.C. § 112, paragraph 6, under which claims recited in "means plus function" format cover the disclosed structure and equivalents thereof. However, the pending claims do not recite "means" limitations, and thus do not evoke considerations of equivalents. Applicant is unaware of any decision in which a non-means claim limitation was considered obvious because prior art was considered "equivalent." Just because something may be "insubstantially different" from

the prior art does not translate to a teaching or motivation in the art to combine references to reach a claimed invention, regardless of the degree of distinction there between.

All pending claims are therefore patentably distinct over the applied art. Reversal of the rejections and instructions to allow all claims is therefore respectfully requested.

2. The §103 rejection of Claim 35
Is Without Basis in the Cited Prior art.

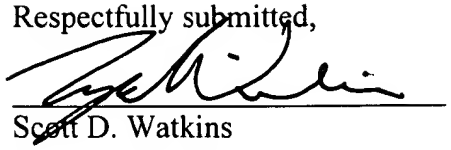
Like claims 1 and 35, claim 36 recites the arranging the dielectric and the conductor to induce turbulence in the flow of gas through the plasma cell. For the reasons discussed above, this feature of claim 36 is neither taught nor suggested by Gadow and/or Kinney.

VIII. CONCLUSION

As demonstrated above herein, the Gadow and Kinney references are inadequate, individually and collectively, as bases for rejection of any of Appellants' independent claims 1, 35 and 36. Therefore, reversal of the stated rejections of those claims, and allowance of all claims are respectfully requested.

The PTO is hereby authorized to charge/credit any fee deficiencies or overpayments to Deposit Account No. 19-4293 (Order No. 12492.0047).

Respectfully submitted,



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APPENDIX

CLAIMS ON APPEAL

1. A dielectric barrier discharge plasma cell, comprising:

a conductor adapted to receive an alternating current voltage; and

a dielectric spaced apart from said conductor, said dielectric comprising:

a dielectric substrate having a first surface nearer to said conductor and a second surface, opposite said first surface and farther away from said conductor;

a conductive coating on said second surface of said dielectric substrate, adapted to receive the alternating current voltage; and

a protective coating covering the conductive coating and located on the side of the dielectric substrate farther away from said conductor;

wherein said cell is adapted to generate plasma in the space between said conductor and said dielectric in response to the application of the alternating current voltage, said dielectric and said conductor are positioned to create a turbulent air flow therebetween, and said cell is configured for stacking with another substantially similar dielectric discharge plasma cell.

2. The dielectric barrier discharge plasma cell of claim 1 wherein said dielectric and said conductor are uniformly spaced from one another.

3. The dielectric barrier discharge plasma cell of claim 1 further comprising a transformer and wherein said alternating current voltage is raised from an input voltage to an operational voltage by said transformer.

4. The dielectric barrier discharge plasma cell of claim 1 wherein said conductor consists of a conductor substrate and a conductor coating layer.

5. The dielectric barrier discharge plasma cell of claim 4 wherein said conductor substrate comprises an electrode.

6. The dielectric barrier discharge plasma cell of claim 4 wherein said conductor substrate comprises stainless steel.

7. The dielectric barrier discharge plasma cell of claim 4 wherein said conductor substrate comprises aluminum.

8. The dielectric barrier discharge plasma cell of claim 4 wherein said conductor substrate comprises copper.

9. The dielectric barrier discharge plasma cell of claim 4 wherein said conductor coating layer comprises a catalyst.

10. The dielectric barrier discharge plasma cell of claim 9 wherein said catalyst comprises nickel.

11. The dielectric barrier discharge plasma cell of claim 1 further comprising a plurality of spacer elements for spacing said dielectric and said conductor.

13. The dielectric barrier discharge plasma cell of claim 1 further comprising an adhesion layer between said conductive coating and said dielectric substrate.

14. The dielectric barrier discharge plasma cell of claim 13 wherein said adhesion layer comprises titanium.

15. The dielectric barrier discharge plasma cell of claim 13 wherein said adhesion layer comprises chromium.

16. The dielectric barrier discharge plasma cell of claim 13 wherein said adhesion layer is about 400 angstroms to about 600 angstroms in thickness.

17. The dielectric barrier discharge plasma cell of claim 13 wherein said adhesion layer is sputter coated onto said dielectric substrate.

18. The dielectric barrier discharge plasma cell of claim I wherein said conductive coating comprises copper.

19. The dielectric barrier discharge plasma cell of claim 1 wherein said conductive coating is about 25 microns to 100 microns in thickness.

20. The dielectric barrier discharge plasma cell of claim 13 wherein said conductive coating is sputter coated onto said adhesion layer.

21. The dielectric barrier discharge plasma cell of claim 13 wherein said conductive coating is sputter coated onto said adhesion layer for about 2000 angstroms in thickness and then plated onto said adhesion layer.

22. The dielectric barrier discharge plasma cell of claim 1 wherein said protective layer comprises nickel.

23. The dielectric barrier discharge plasma cell of claim 1 wherein said protective layer comprises a tin based solder alloy.

24. The dielectric barrier discharge plasma cell of claim 1 wherein said protective layer is about 25 microns to about 100 microns in thickness.

25. The dielectric barrier discharge plasma cell of claim 1 wherein said protective layer is plated onto said conductive coating.

26. The dielectric barrier discharge plasma cell of claim 1 wherein said second surface of said dielectric substrate is treated such that said conductive coating adheres thereto.

27. The dielectric barrier discharge plasma cell of claim 26 wherein said second surface of said dielectric substrate is sand blasted.

28. The dielectric barrier discharge plasma cell of claim 26 wherein said second surface of said dielectric substrate is ground.

29. The dielectric barrier discharge plasma cell of claim 2 wherein said dielectric and said conductor are arranged as parallel plates.

30. The dielectric barrier discharge plasma cell of claim 29 wherein said dielectric and said conductor are corrugated.

31. The dielectric barrier discharge plasma cell of claim 1 wherein said dielectric is cylindrical.

32. The dielectric barrier discharge plasma cell of claim 31 wherein said conductor is coaxial with said dielectric.

33. The dielectric barrier discharge plasma cell of claim 31 wherein said conductor comprises at least one cork screw shaped element.

34. The dielectric barrier discharge plasma cell of claim 33 wherein said cork screw shaped element comprises a thin electrode.

35. A dielectric barrier discharge plasma system, comprising: a plurality of dielectric barrier discharge plasma cells, wherein each of said dielectric barrier discharge plasma cells comprises: a conductor adapted to receive an alternating current voltage; and a dielectric spaced apart from said conductor, said dielectric comprising: a dielectric substrate having a first surface nearer to said conductor and a second surface, opposite said first surface and farther from said conductor; and a conductive coating on said second surface of said dielectric substrate, adapted to receive an alternating current voltage; wherein said dielectric and said conductor are positioned to create a turbulent air flow therebetween, said cells are generally rectangular in cross-section and are adapted to generate plasma in the space between said conductor and said dielectric, and said plurality of dielectric barrier discharge plasma cells are arranged radially.

36. A dielectric barrier discharge plasma system, comprising: a plurality of dielectric barrier discharge plasma cells, wherein each of said dielectric barrier discharge plasma cells comprises: a conductor adapted to receive an alternating current voltage; and a dielectric spaced apart from said conductor, said dielectric comprising: a dielectric substrate having a first surface nearer to said conductor and a second surface, opposite said first surface and farther from said conductor; a conductive coating on said second surface of said dielectric substrate, adapted to receive an alternating current voltage; and a protective layer covering the conductive coating and located on the side of the dielectric substrate farther away from said conductor; wherein said dielectric and said conductor are positioned to create a turbulent air flow therebetween, said cells are generally rectangular in cross-section and are adapted to generate plasma in the space

between said conductor and said dielectric, and said plurality of dielectric barrier discharge plasma cells are stacked.

EVIDENCE APPENDIX

No evidence was submitted in this application pursuant to any of 37 C.F.R. §§1.130, 1.131, or 1.132.

RELATED PROCEEDINGS APPENDIX

As stated in part II of this brief, none.